

MOISTURE & DENSITY TEST

Client : URS/ARUP/HMM JV

Project : California High Speed Train

ISI Lab No.: G-52568
Job no : 2636-001.0

Boring #	S0029R	S0029R	S0029R					
Sample #	SS04	MC12-1	SS13					
Depth (ft.)	16.0-16.5	51.0-51.5	56.0-56.5					
Soil type: (visual)	Sand	Silty sand	Sand					
1. Date tested:	09/13/13	09/13/13	09/13/13					1.
2. Tested by:	PH	PH	PH					2.
3. Specimen height (in.)		4.02						3.
4. Wt. of specimen + tare (gm)		555.89						4.
5. Tare wt. (gm)		0.00						5.
6. Diameter (in.)		2.40						6.
7. Wet wt. of soil + dish wt. (gm)	324.41	288.46	328.96					7.
8. Dry wt. of soil + dish wt. (gm)	277.72	242.52	295.59					8.
9. Wt. of dish (gm)	50.55	50.39	50.95					9.
10. Dish ID								10.
Wet Density (pcf)		116.3						
Dry Density (pcf)		93.9						
Moisture Content (%)	20.6	23.9	13.6					
Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Void Ratio		0.794						
Saturation (%)		81.3						
Additional data:								
Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								



Lab. Tech : K. Ford
Date Completed : 1/20/14

Notes:

Engineering Materials Laboratory
4539 N. Brawley #108, Fresno, CA 93722
559-276-9311

MOISTURE & DENSITY TEST

Client : URS/ARUP/HMM JV

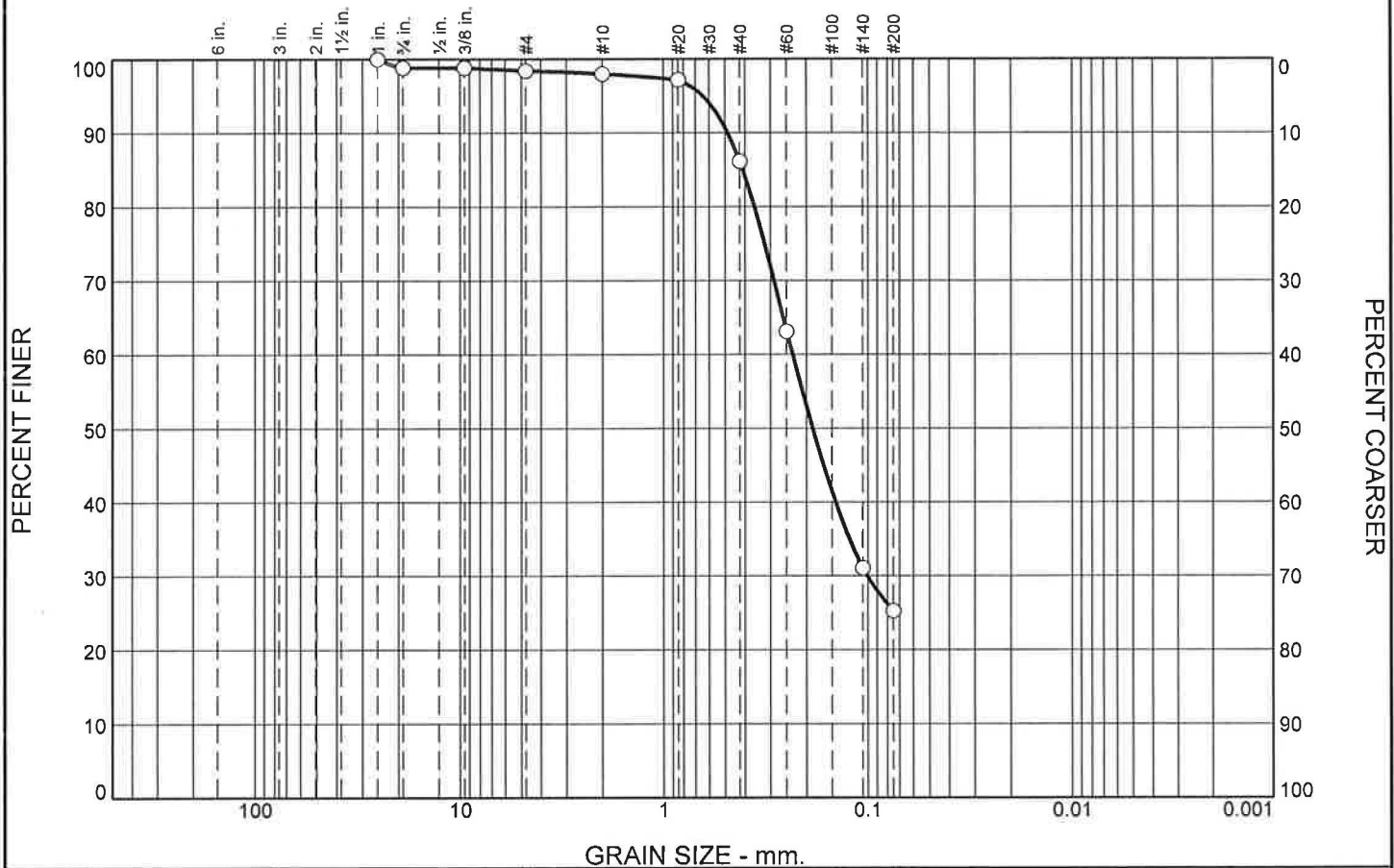
Project : California High Speed Train

ISI Lab No.: G-52923

Job no : 2636-001.0

Boring #	S0029R	S0029R	S0030R	S0033AR	S0069AR	S0069AR	S0069AR	S0069R
Sample #	MC09-2	U10	MC10-3	SS16	U11	MC16-1	MC18-1	MC02-2
Depth (ft.)	41.0-41.5	42.0-44.5	42.0-42.5	50.0-51.5	42.0-44.5	65.0-66.5	75.0-76.5	5.5-6.0
Soil type: (visual)	Grayish brown silty clay	Olive brown sandy silt	Greenish gray clayey sand	Grayish brown silt with sand (BAGGIE COULD NOT DO MD)	Olive brown sandy clay	Olive gray sandy clay	Olive brown silty clay	Grayish green clay with sand
1. Date tested:	01/17/14	01/17/14	01/17/14	01/15/14	01/17/14	01/17/14	01/17/14	01/17/14
2. Tested by:	JH	JH	JH	JH	JH	JH	JH	JH
3. Specimen height (in.)	5.96	3.93	5.90		3.96	6.00	6.00	5.95
4. Wt. of specimen + tare (gm)	900.72	868.95	815.58		880.48	951.22	956.29	897.34
5. Tare wt. (gm)	0.00	0.00	0.00		0.00	0.00	0.00	0.00
6. Diameter (in.)	2.41	2.85	2.37		2.87	2.42	2.42	2.41
7. Wet wt. of soil + dish wt. (gm)	276.47	264.91	298.04	98.44	273.64	275.82	301.24	293.74
8. Dry wt. of soil + dish wt. (gm)	229.46	229.54	247.22	90.20	239.02	239.79	257.94	255.15
9. Wt. of dish (gm)	50.59	50.41	50.06	50.96	51.20	50.87	50.41	50.89
10. Dish ID								
Wet Density (pcf)	126.1	131.9	119.3		130.8	131.2	131.9	125.8
Dry Density (pcf)	99.9	110.2	94.8		110.5	110.2	109.1	105.8
Moisture Content (%)	26.3	19.7	25.8	21.0	18.4	19.1	20.9	18.9
Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Void Ratio	0.687	0.529	0.777		0.525	0.529	0.544	0.592
Saturation (%)	103.3	100.7	89.6		94.8	97.3	103.6	86.2
Additional data:								
Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	1	0	12	61	25	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100		
3/4	99		
3/8	99		
#4	98		
#10	98		
#20	97		
#40	86		
#60	63		
#140	31		
#200	25		

* (no specification provided)

Soil Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.4862 D₈₅= 0.4108 D₆₀= 0.2338
D₅₀= 0.1868 D₃₀= 0.1007 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

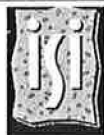
Remarks

F.M.=1.01

Source of Sample: S0029R G-52568
Sample Number: B-01

Depth: 0-5

Date: 09/07/13

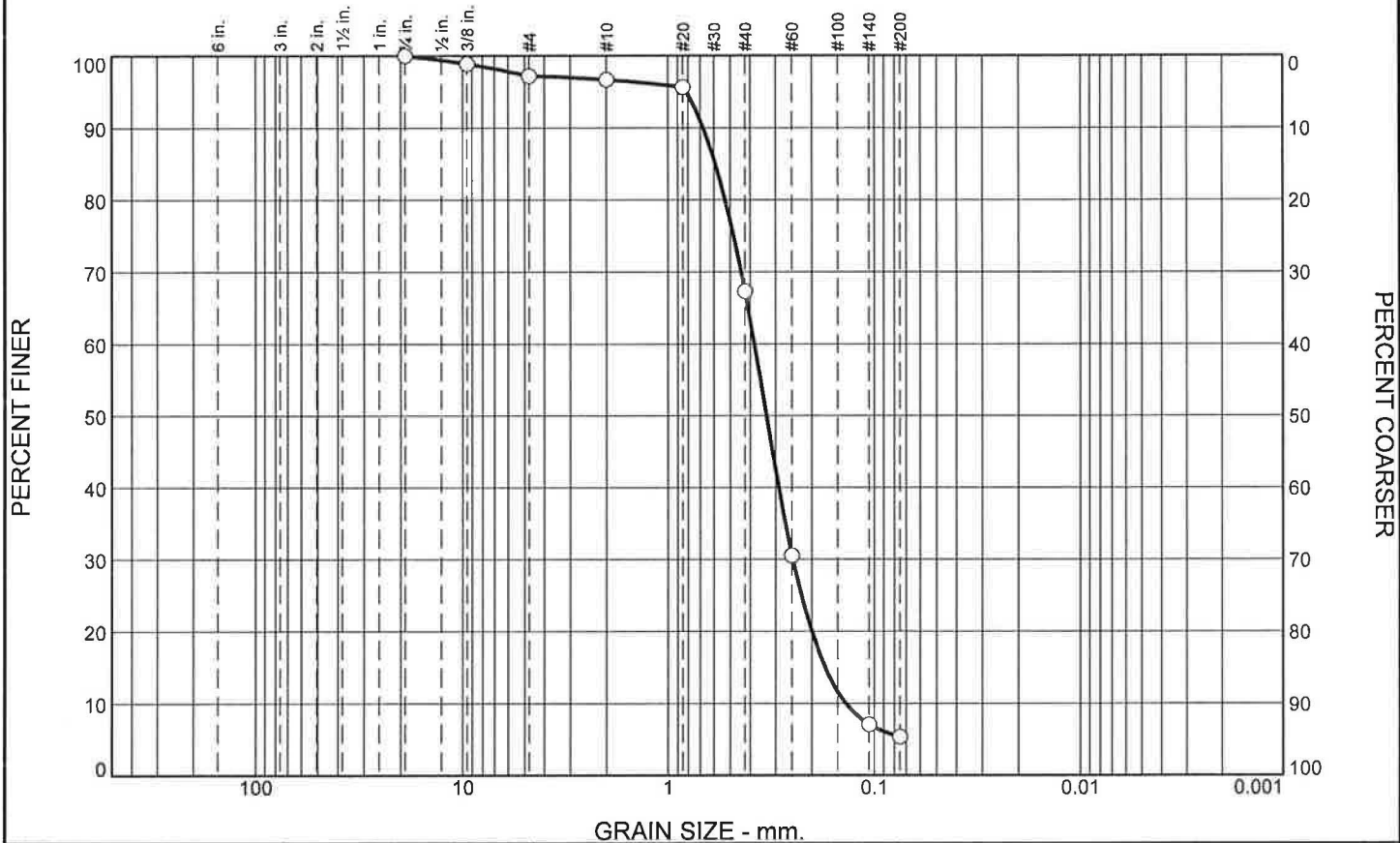


Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	0	30	62	5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	99		
#4	97		
#10	97		
#20	96		
#40	67		
#60	31		
#140	7		
#200	5		

(no specification provided)

Soil Description		
Sand		
<div> <div> Atterberg Limits </div> <div> PL= </div> <div> LL= </div> <div> PI= </div> </div>		
<div> <div> Coefficients </div> <div> D₉₀= 0.6773 </div> <div> D₅₀= 0.3326 </div> <div> D₁₀= 0.1374 </div> <div> C_u= 2.78 </div> </div>		
<div> <div> Classification </div> <div> USCS= </div> <div> AASHTO= </div> </div>		
<div> <div> Remarks </div> <div> F.M.=1.71 </div> </div>		

Source of Sample: S0029R G-52568
Sample Number: MC03-2

Depth: 10.5-11.0

Date: 09/25/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

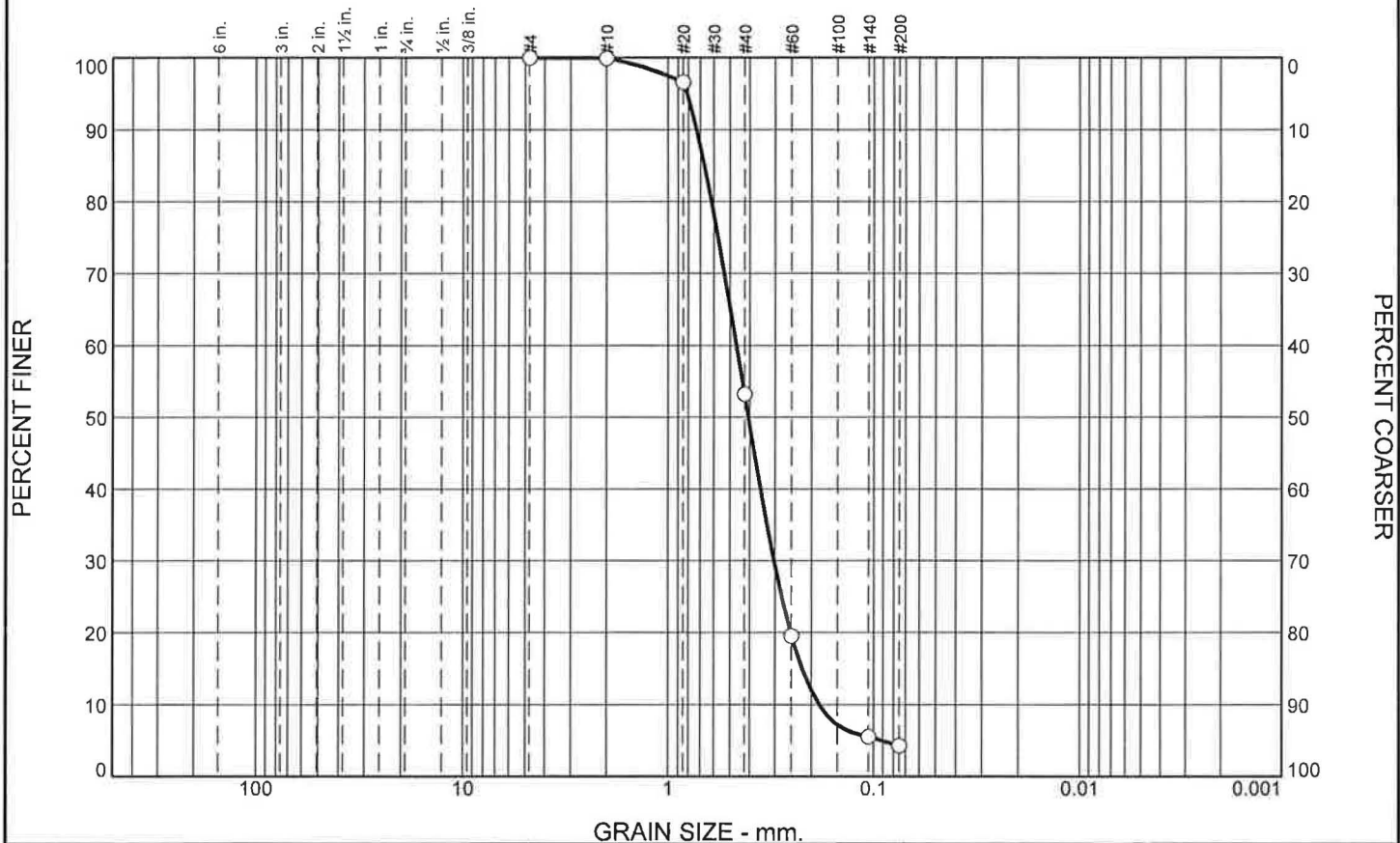
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	47	49	4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	97		
#40	53		
#60	20		
#140	6		
#200	4		

* (no specification provided)

Soil Description

Sand

PL= **Atterberg Limits** PI=

LL=

Coefficients

D₉₀= 0.7313 D₈₅= 0.6685 D₆₀= 0.4654

D₅₀= 0.4068 D₃₀= 0.3040 D₁₅= 0.2225

D₁₀= 0.1837 C_u= 2.53 C_c= 1.08

Classification

USCS= SP AASHTO=

Remarks

F.M.=1.87

Source of Sample: S0029R G-52568
Sample Number: SS04

Depth: 16.0-16.5

Date: 09/13/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

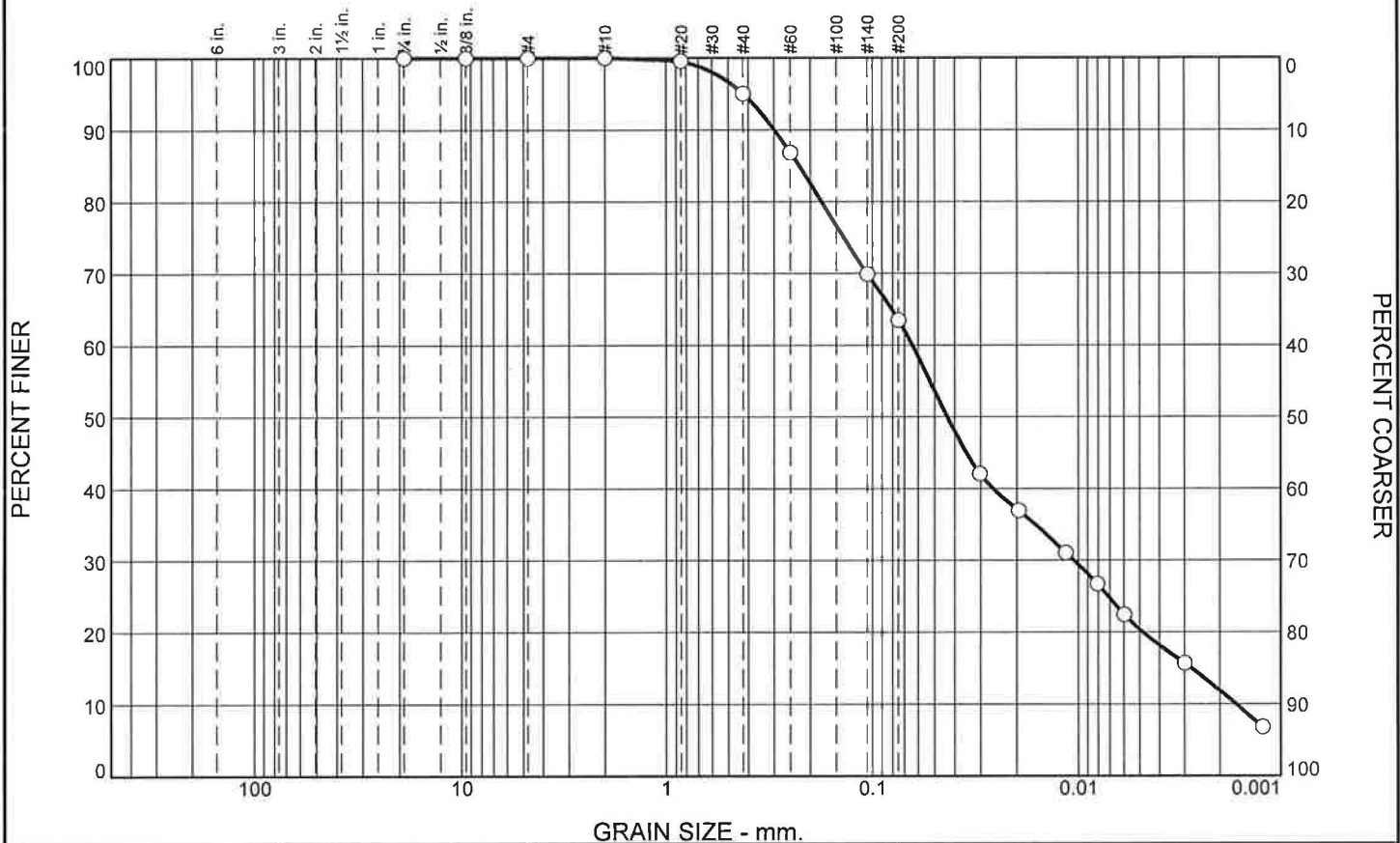
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	5	31	44	20

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	100		
#20	100		
#40	95		
#60	87		
#140	70		
#200	64		
0.0303 mm.	42		
0.0195 mm.	37		
0.0115 mm.	31		
0.0081 mm.	27		
0.0060 mm.	22		
0.0030 mm.	16		
0.0012 mm.	7		

* (no specification provided)

Soil Description
Sandy silt with clay

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.2986 D₈₅= 0.2270 D₆₀= 0.0643
 D₅₀= 0.0436 D₃₀= 0.0105 D₁₅= 0.0028
 D₁₀= 0.0017 C_u= 38.65 C_c= 1.03

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.35

Source of Sample: S0029R G-52568
 Sample Number: SS06

Depth: 26.0-26.5

Date: 09/17/13



Client: URS/ARUP/HMM JV
 Project: California High Speed Train

Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH



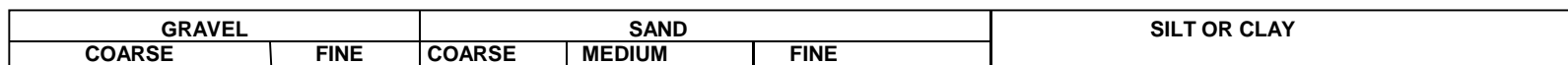
*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis for Soil / Fine Aggregate ASTM C-136

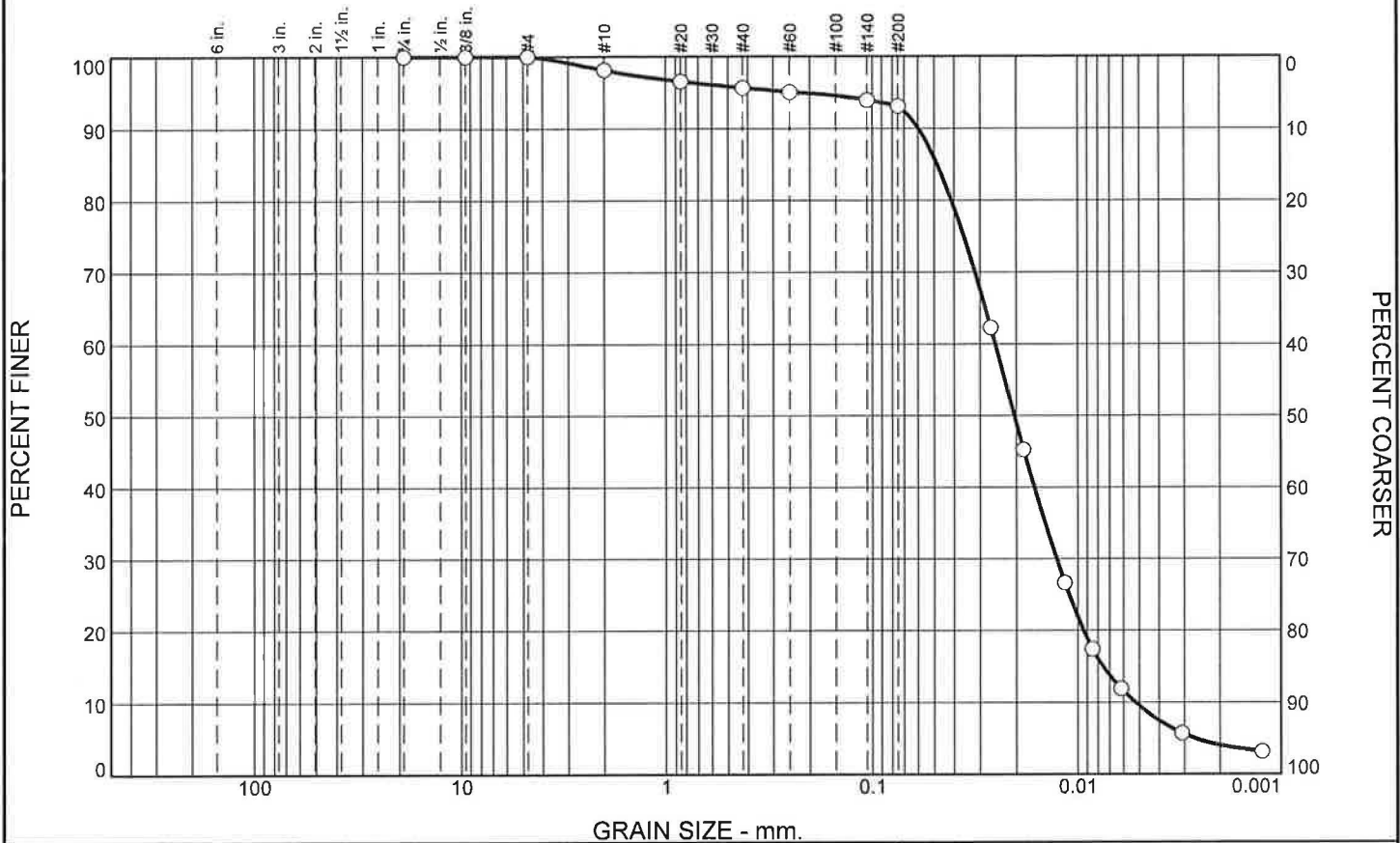
Project:	CA HSR	Technician:	K. Ford
		Date:	1/16/2014
TES#:	23502-ZS9	Sample No.:	MC07-1
Boring #:	S0029R; 30.9-31.4'	Classification:	(SM) Silty Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	174.1	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	174.1	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	141.5	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.1	0.1	0.1	99.9	
#16	4.2	4.1	2.4	97.6	
#30	22.5	18.3	12.9	87.1	
#50	61.2	38.7	35.2	64.8	
#100	100.9	39.7	58.0	42.0	
#200	132.5	31.6	76.1	23.9	
Pan	141.5				

[illegible]

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	2	3	83	10

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	98		
#20	97		
#40	96		
#60	95		
#140	94		
#200	93		
0.0267 mm.	62		
0.0185 mm.	45		
0.0116 mm.	27		
0.0085 mm.	17		
0.0062 mm.	12		
0.0031 mm.	6		
0.0012 mm.	3		

* (no specification provided)

Soil Description		
Silt		
Atterberg Limits		
PL=	LL=	PI=
Coefficients		
D ₉₀ = 0.0598	D ₈₅ = 0.0485	D ₆₀ = 0.0254
D ₅₀ = 0.0205	D ₃₀ = 0.0127	D ₁₅ = 0.0076
D ₁₀ = 0.0052	C _u = 4.86	C _c = 1.22
Classification		
USCS=	AASHTO=	
Remarks		
F.M.=0.18		

Source of Sample: S0029R G-52568
Sample Number: SS08

Depth: 36.0-36.5

Date: 09/17/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

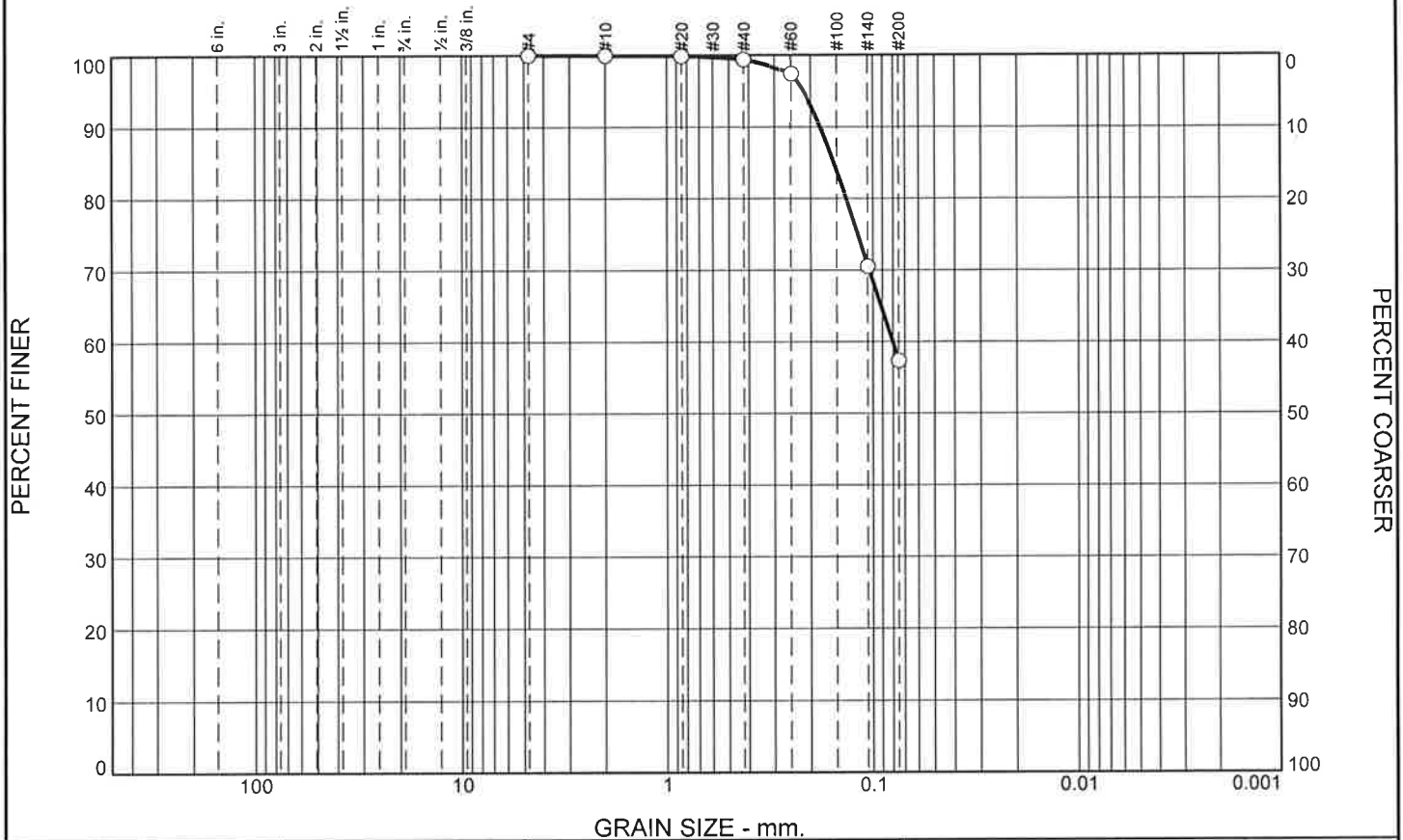
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	42	57	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	100		
#40	99		
#60	97		
#140	71		
#200	57		

* (no specification provided)

Soil Description
Olive brown sandy silt

Atterberg Limits
 PL= NP LL= NP PI= NP

Coefficients
 D₉₀= 0.1809 D₈₅= 0.1553 D₆₀= 0.0804
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(0)

Remarks
 F.M.=0.18

Source of Sample: S0029R G-52568
Sample Number: U10

Depth: 42.0-44.5

Date: 1/17/14



Client: URS/ARUP/HMM JV
Project: California High Speed Train

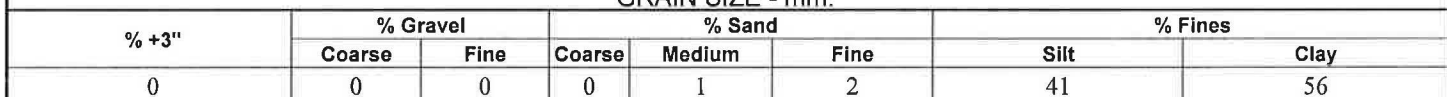
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Figure

Tested By: JH

Checked By: PH

PERCENT COARSER



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	100		
#20	100		
#40	99		
#60	98		
#140	97		
#200	97		
0.0230 mm.	88		
0.0148 mm.	86		
0.0090 mm.	78		
0.0067 mm.	69		
0.0051 mm.	57		
0.0028 mm.	33		
0.0013 mm.	13		

Silty clay

 $PL =$
$$LL =$$
$$P| =$$

Coefficients

$$\begin{aligned} D_{90} &= 0.0318 \\ D_{50} &= 0.0043 \\ D_{10} &= \end{aligned}$$

D₈₅= 0.0130
D₃₀= 0.0025
C_u=

$$\begin{aligned} D_{60} &= 0.0054 \\ D_{15} &= 0.0014 \\ C_c &= \end{aligned}$$

Classification

USCS=

LOCATION
AASHTO=

Remarks

$$F.M.=0.05$$

Date: 09/19/13



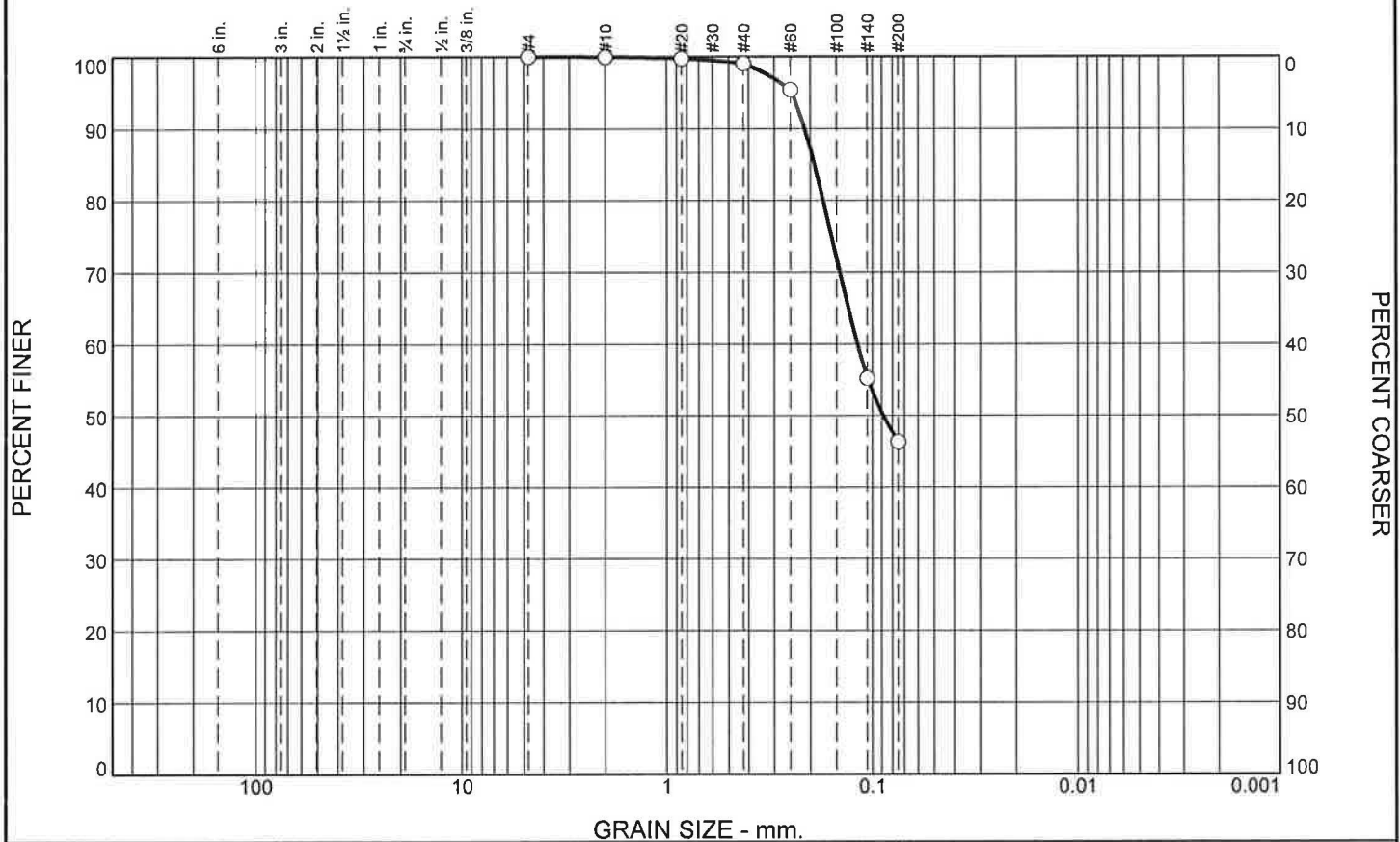
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	53	46	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	100		
#40	99		
#60	95		
#140	55		
#200	46		

* (no specification provided)

<u>Soil Description</u>		
Silty sand		
<u>Atterberg Limits</u>		
PL=	LL=	PI=
<u>Coefficients</u>		
D ₉₀ = 0.2140	D ₈₅ = 0.1918	D ₆₀ = 0.1188
D ₅₀ = 0.0887	D ₃₀ =	D ₁₅ =
D ₁₀ =	C _u =	C _c =
<u>Classification</u>		
USCS=	AASHTO=	
<u>Remarks</u>		
F.M.=0.32		

Source of Sample: S0029R G-52568
Sample Number: MC12-1

Depth: 51.0-51.5

Date: 09/13/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

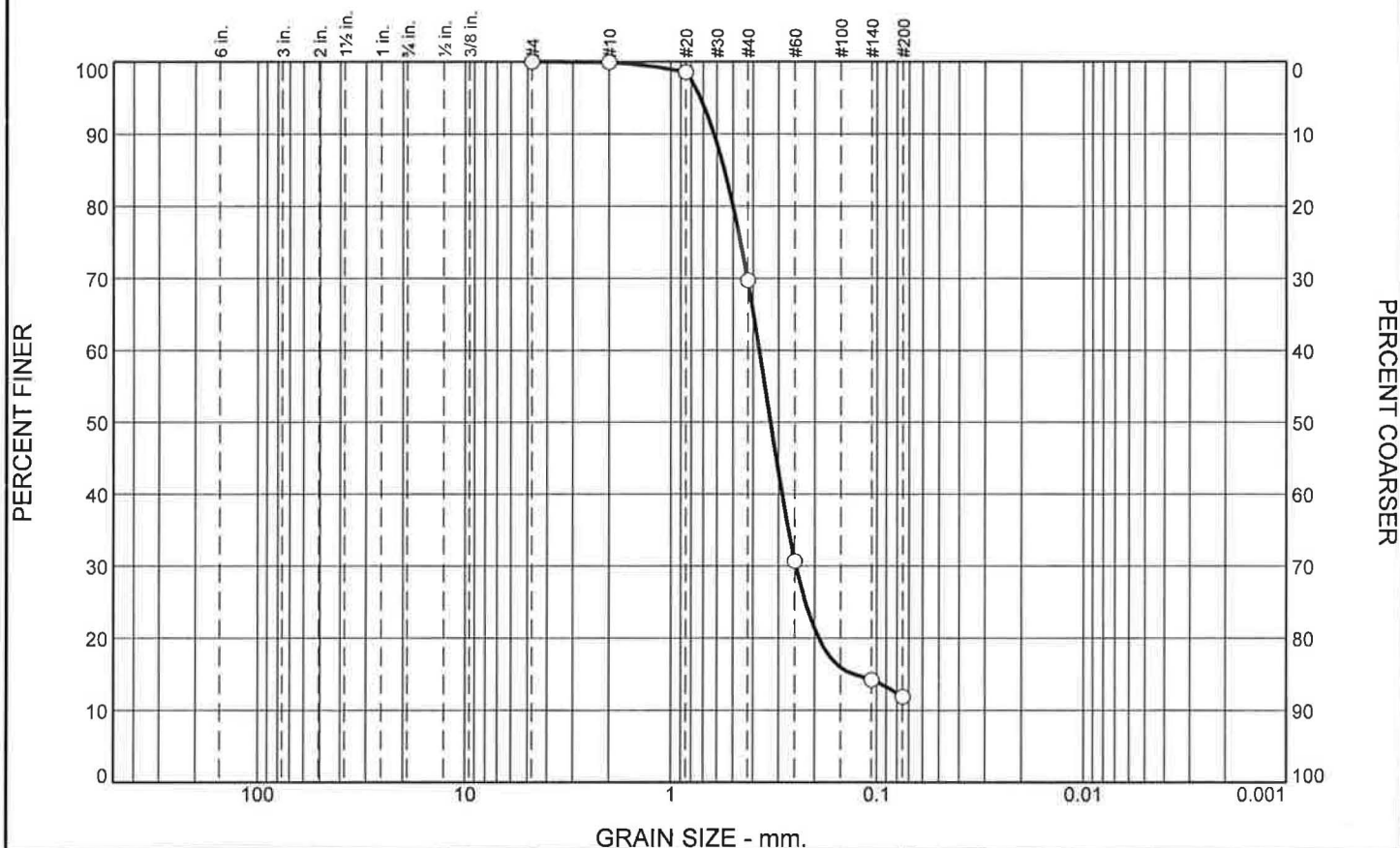
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	30	58	12	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	99		
#40	70		
#60	31		
#140	14		
#200	12		

* (no specification provided)

Soil Description

Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.6205 D₈₅= 0.5520 D₆₀= 0.3729
D₅₀= 0.3286 D₃₀= 0.2469 D₁₅= 0.1286
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

F.M.=1.53

Source of Sample: S0029R G-52568
Sample Number: SS13

Depth: 56.0-56.5

Date: 09/13/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

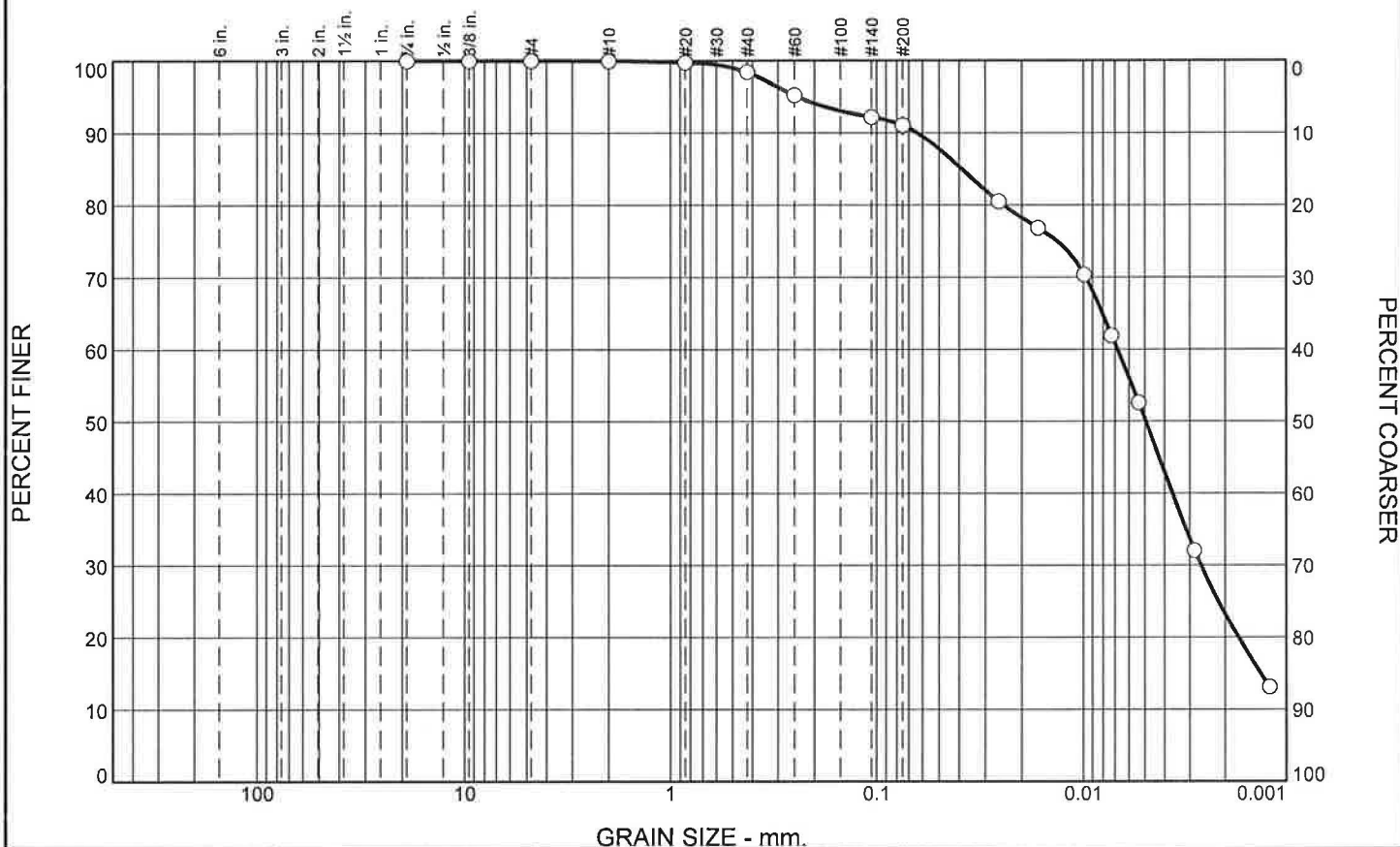
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	7	41	50

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	100		
#20	100		
#40	98		
#60	95		
#140	92		
#200	91		
0.0259 mm.	81		
0.0167 mm.	77		
0.0099 mm.	70		
0.0073 mm.	62		
0.0054 mm.	53		
0.0028 mm.	32		
0.0012 mm.	13		

* (no specification provided)

Soil Description
Silty clay

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.0637 D₈₅= 0.0389 D₆₀= 0.0068
 D₅₀= 0.0049 D₃₀= 0.0026 D₁₅= 0.0013
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.11

Source of Sample: S0029R G-52568
Sample Number: SS15

Depth: 66.0-66.5

Date: 09/17/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

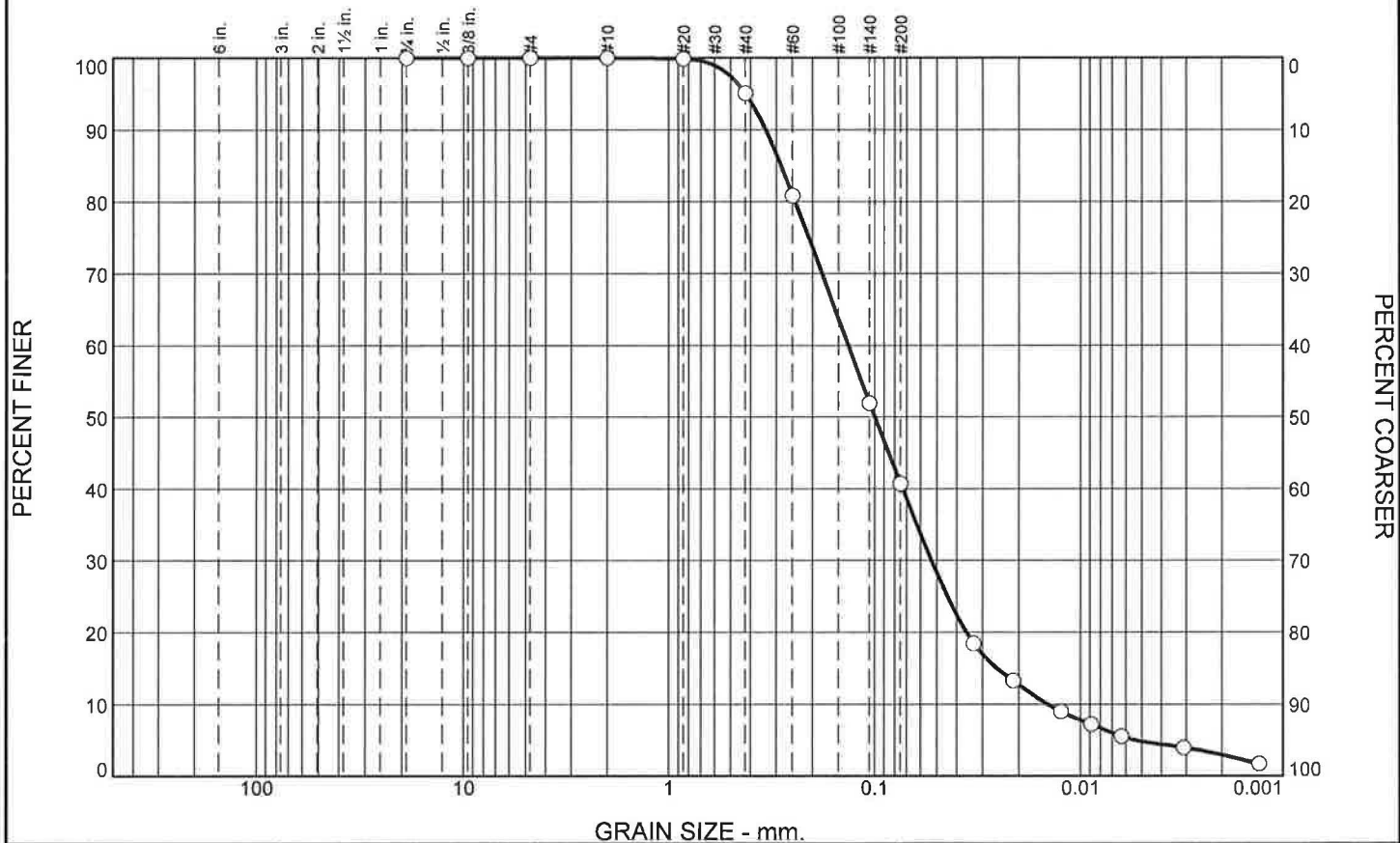
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	5	54	36	5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	100		
#20	100		
#40	95		
#60	81		
#140	52		
#200	41		
0.0331 mm.	18		
0.0213 mm.	13		
0.0125 mm.	9		
0.0089 mm.	7		
0.0063 mm.	6		
0.0031 mm.	4		
0.0013 mm.	2		

* (no specification provided)

<u>Soil Description</u>		
Silty sand		
<u>Atterberg Limits</u>		
PL=	LL=	PI=
<u>Coefficients</u>		
D ₉₀ = 0.3387	D ₈₅ = 0.2848	D ₆₀ = 0.1347
D ₅₀ = 0.0999	D ₃₀ = 0.0532	D ₁₅ = 0.0255
D ₁₀ = 0.0144	C _u = 9.35	C _c = 1.46
<u>Classification</u>		
USCS=	AASHTO=	
<u>Remarks</u>		
F.M.=0.51		

Source of Sample: S0029R G-52568
Sample Number: SS20

Depth: 86.0-86.5

Date: 9/19/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

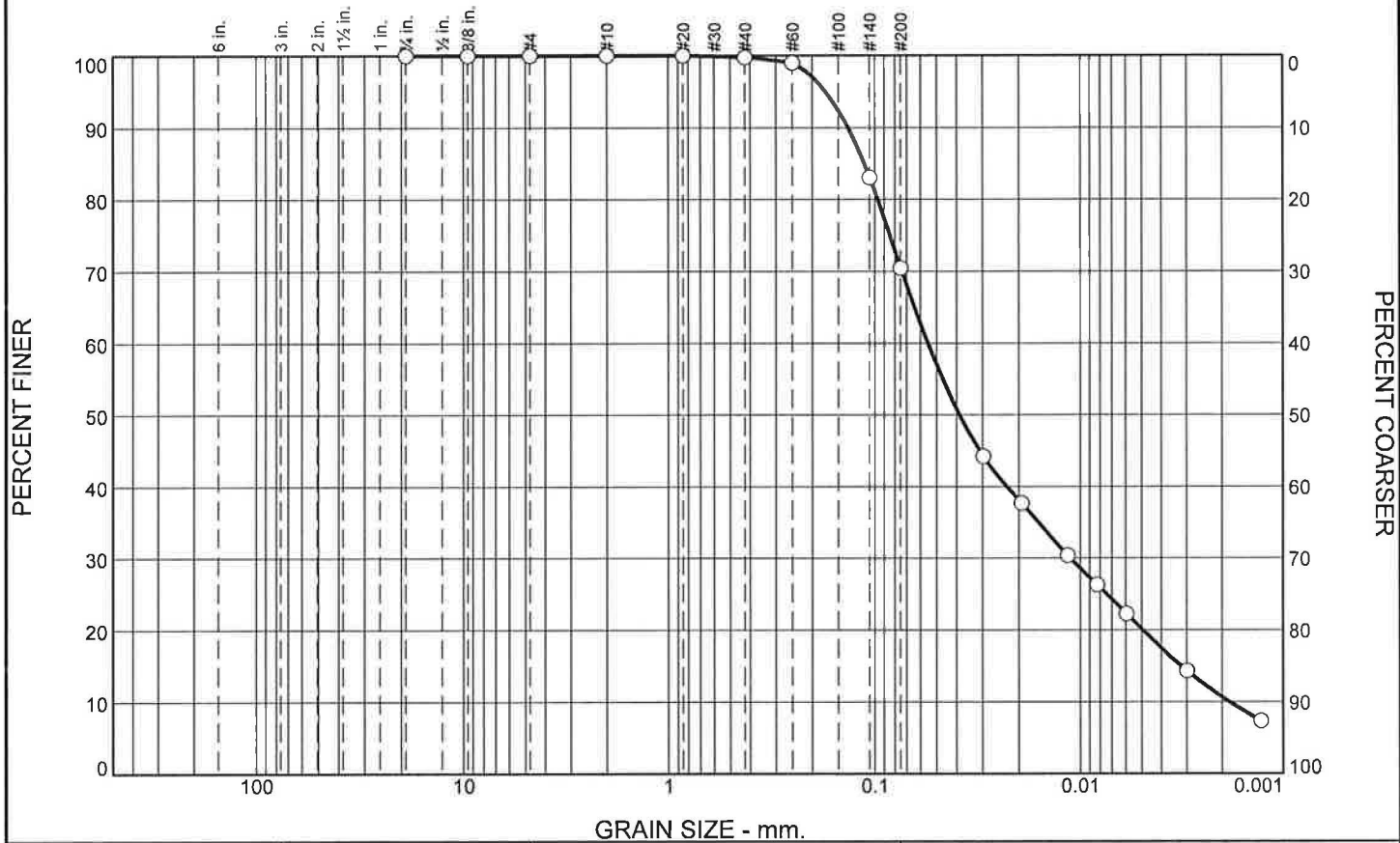
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	30	50	20

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100		
3/8	100		
#4	100		
#10	100		
#20	100		
#40	100		
#60	99		
#140	83		
#200	70		
0.0298 mm.	44		
0.0194 mm.	38		
0.0115 mm.	30		
0.0083 mm.	26		
0.0059 mm.	22		
0.0030 mm.	14		
0.0013 mm.	7		

(no specification provided)

Soil Description

Sandy silt with clay

PL= Atterberg Limits LL= PI=

Coefficients
 D₉₀= 0.1351 D₈₅= 0.1126 D₆₀= 0.0553
 D₅₀= 0.0389 D₃₀= 0.0112 D₁₅= 0.0032
 D₁₀= 0.0018 C_u= 30.17 C_c= 1.24

USCS= Classification AASHTO=

Remarks

F.M.=0.08

Source of Sample: S0029R G-52568
 Sample Number: SS22

Depth: 96.0-96.5

Date: 09/19/13



Client: URS/ARUP/HMM JV
 Project: California High Speed Train

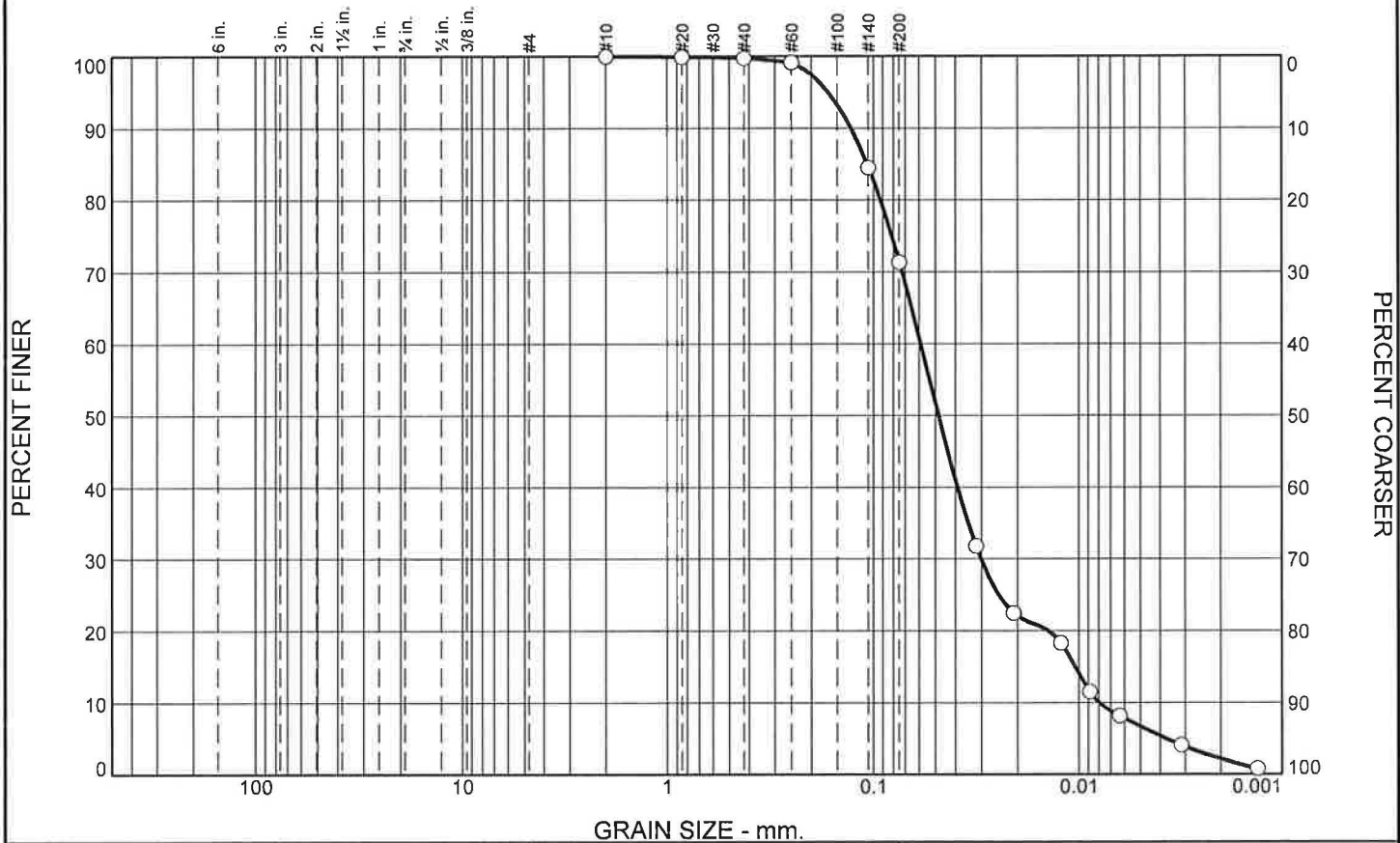
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	29	64	7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#20	100		
#40	100		
#60	99		
#140	85		
#200	71		
0.0319 mm.	32		
0.0209 mm.	23		
0.0123 mm.	18		
0.0089 mm.	12		
0.0063 mm.	8		
0.0031 mm.	4		
0.0013 mm.	1		

* (no specification provided)

<u>Soil Description</u>		
Sandy silt		
<u>Atterberg Limits</u>		
PL=	LL=	PI=
<u>Coefficients</u>		
D ₉₀ = 0.1290	D ₈₅ = 0.1075	D ₆₀ = 0.0591
D ₅₀ = 0.0485	D ₃₀ = 0.0302	D ₁₅ = 0.0104
D ₁₀ = 0.0080	C _u = 7.41	C _c = 1.93
<u>Classification</u>		
USCS=	AASHTO=	
<u>Remarks</u>		
F.M.=0.08		

Source of Sample: S0029R G-52568
Sample Number: MC25-2

Depth: 110.5-111.0

Date: 9/23/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

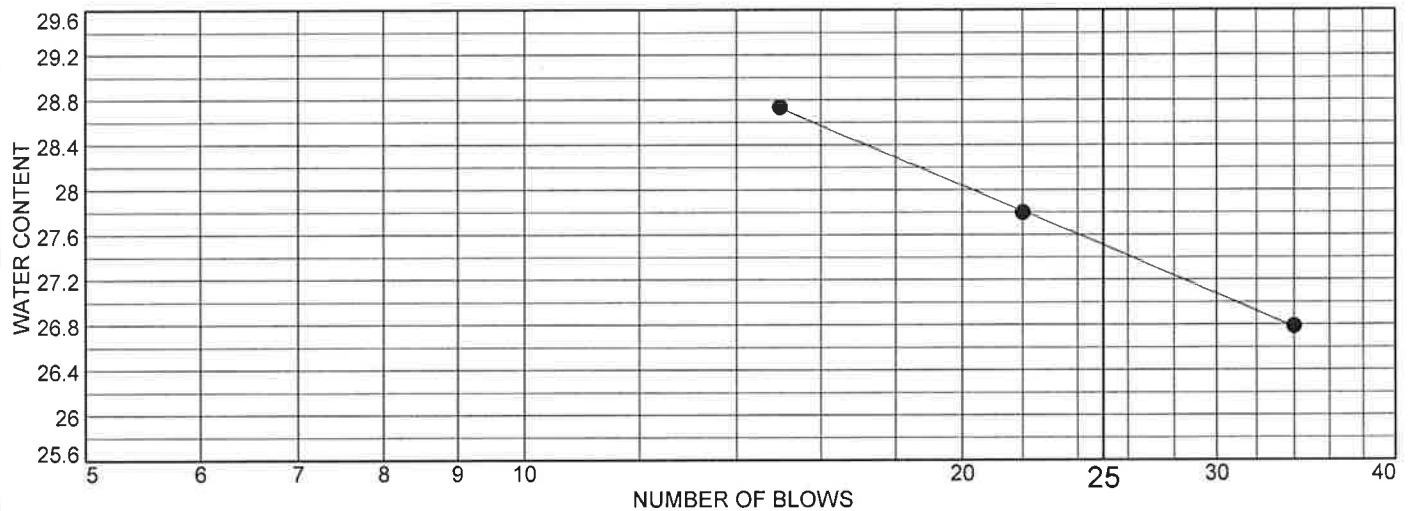
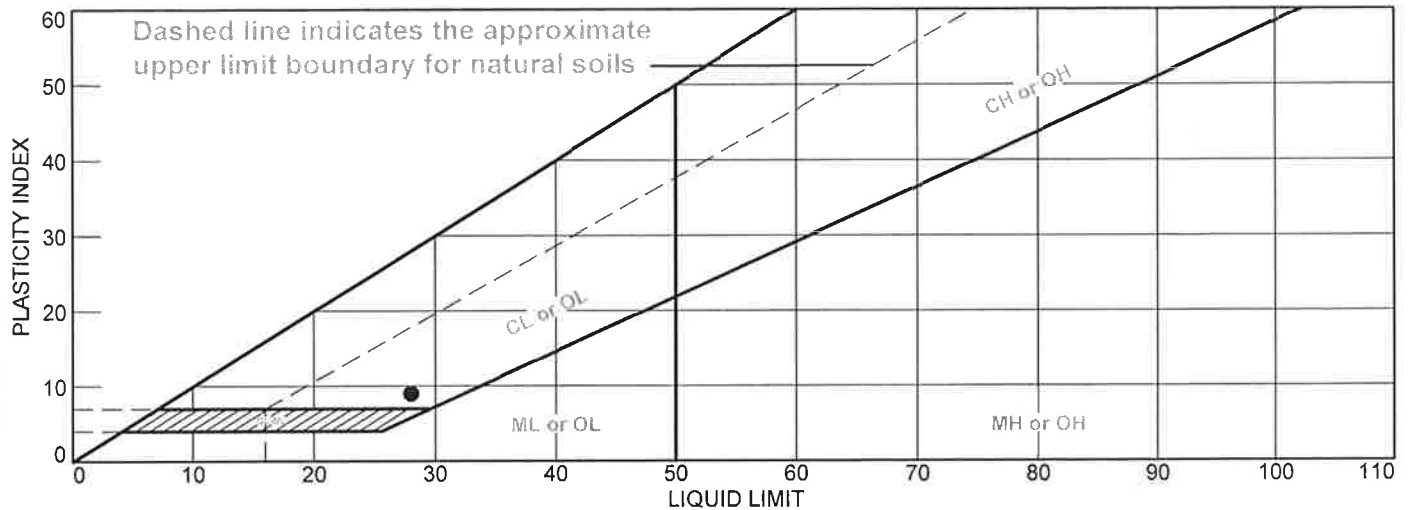
Project No: 2636-001.0

Figure

Tested By: PH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grayish brown silty clay	28	19	9			

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

● Source: S0029R G-52568

Depth: 41.0-41.5

Sample No.: MC09-2

Remarks:

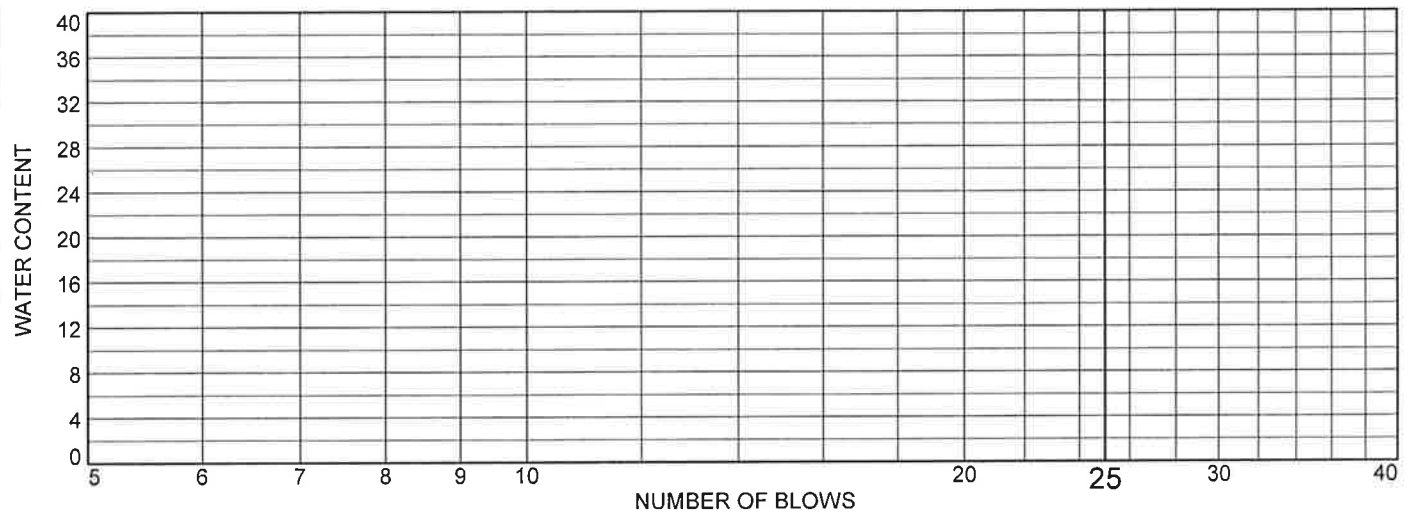
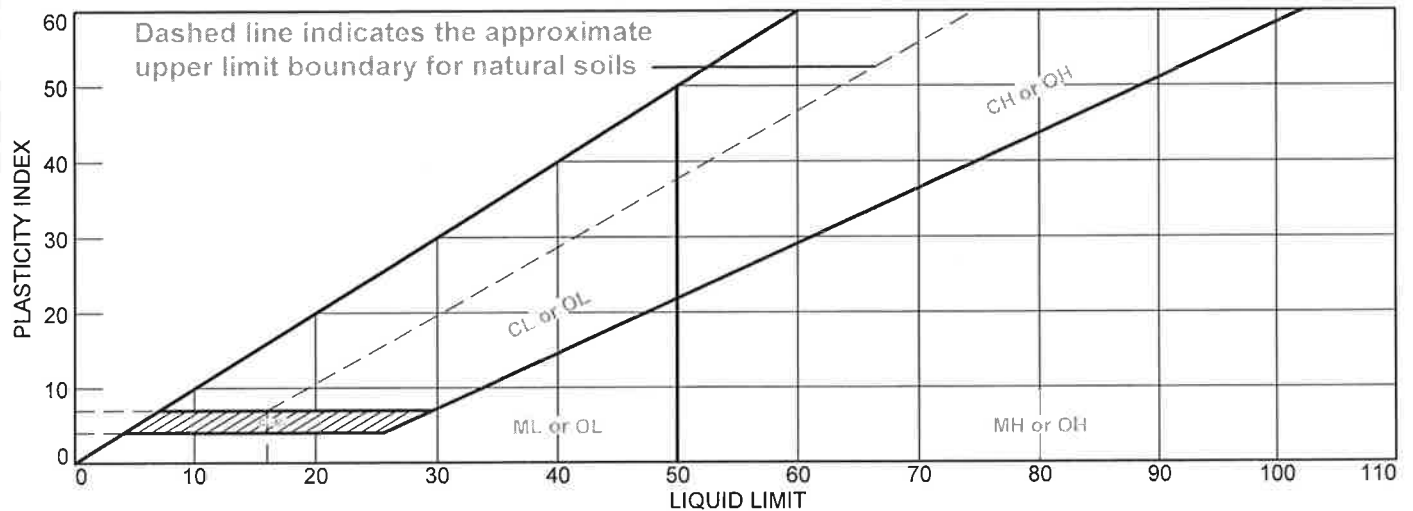


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• Olive brown sandy silt	NP	NP	NP	99	57	ML

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

• Source: S0029R G-52568 Depth: 42.0-44.5 Sample No.: U10

Remarks:



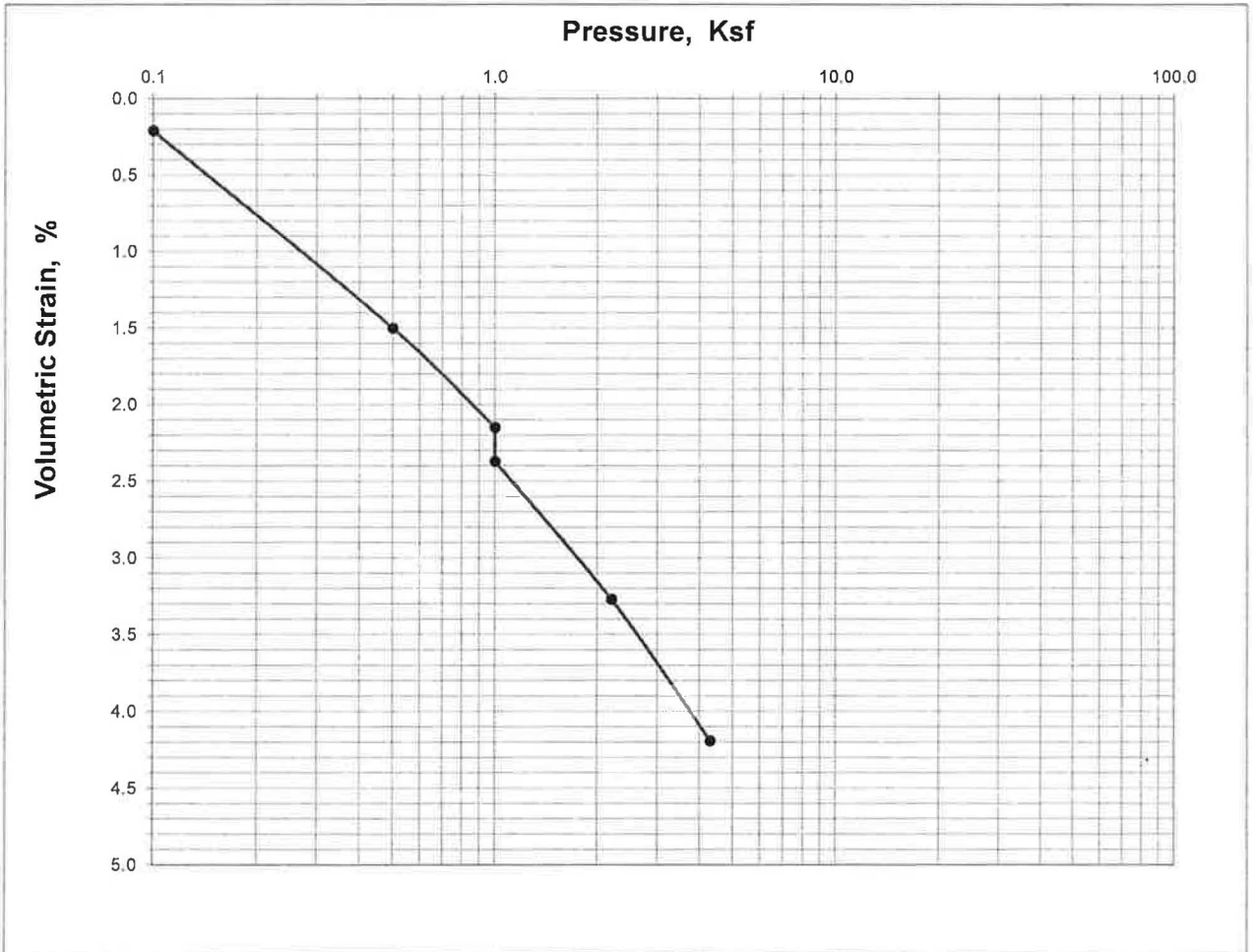
Figure

Tested By: JH

Checked By: PH

COLLAPSE TEST

Boring Number	S0029R	Sample Number	MC03-2	Depth (ft)	10.5-11.0				
Soil Description	Sand								
	Water Content, %	Dry Unit Weight, pcf	Void Ratio	Saturation %	Height in	Diameter in	Specific Gravity	Ic %	
Initial	20.1	94.3	0.787	68.9	1.00	2.420	(assumed)		
Final	21.6	98.5	0.713	81.7			2.70		



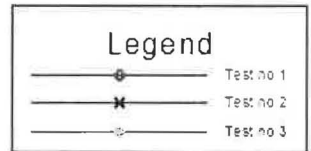
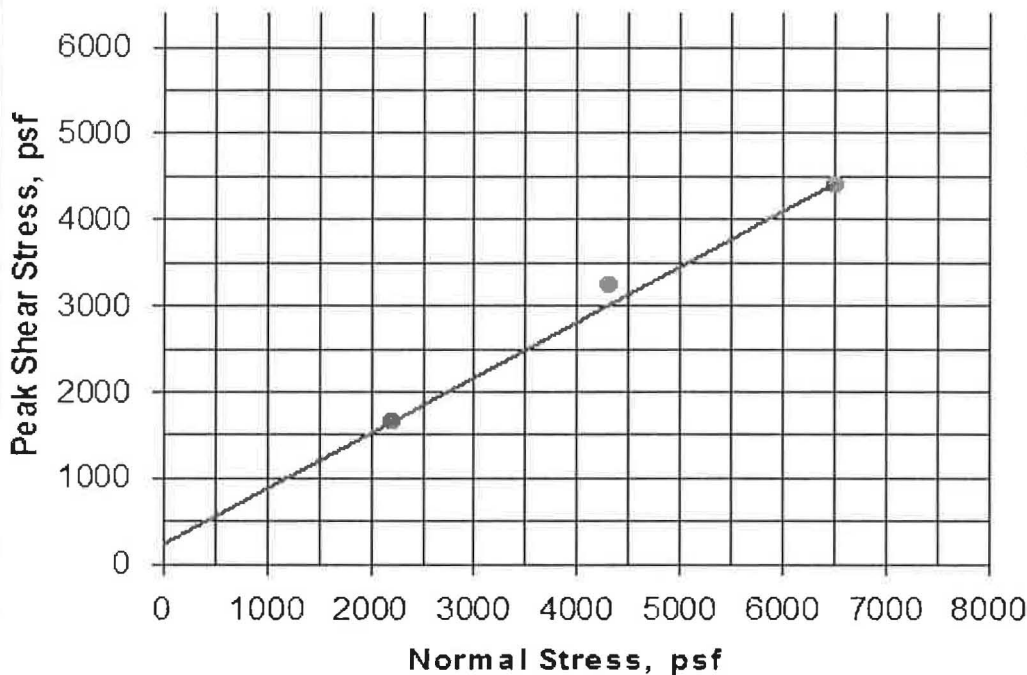
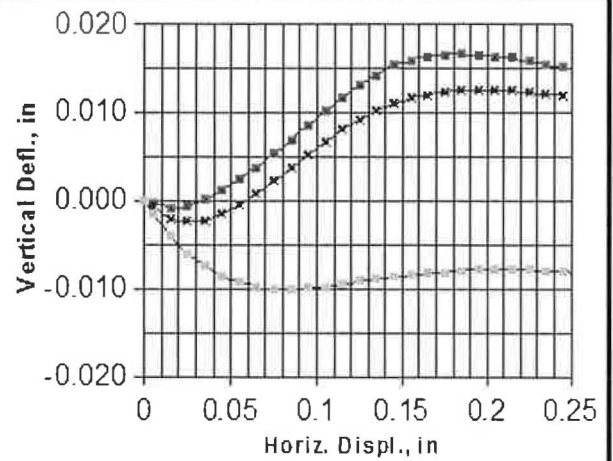
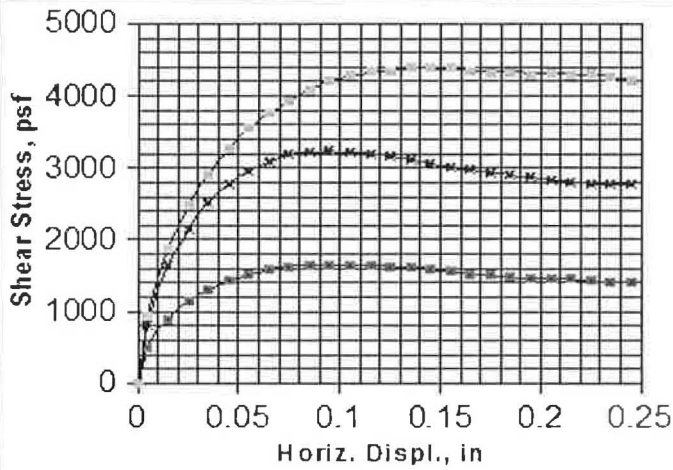
Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 104.7

dry density (pcf) = 92.8

moisture (%) = 12.8

Client: URS/ARUP/HMM JV	Boring #: S0029R	Sample #: MC03-1
Project: California High Speed Train	Depth (ft): 11.0-11.5	
Project #: 2636-001.0 G-52568	Soil: MEDIUM SAND	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Results

C = 250 psf
phi = 33 deg.

Gs = 2.70
Type = undisturbed

trimming note: bottom of tube material was loose and dry

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	2200	1656	0.090	0.18	17.4	92.5	57	0.822	1.00	2.416	14.1	93.9	48	0.794	0.985
2	4300	3240	0.095	0.18	15.1	93.4	51	0.804	1.00	2.416	19.5	95.4	69	0.767	0.979
3	6500	4404	0.145	0.18	10.7	86.9	31	0.940	1.00	2.416	22.4	92.9	74	0.815	0.936

Client: **URS/ARUP/HMM JV**

Boring #: **S0029R**

Sample #: **MC03-1**

Project: **California High Speed Train**

Depth (ft): **11.0-11.5**

Project #: **2636-001.0 G-52568**

Soil: **MEDIUM SAND**

TEST REPORT: Direct shear - inundated, consolidated, & drained test

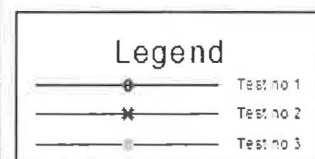
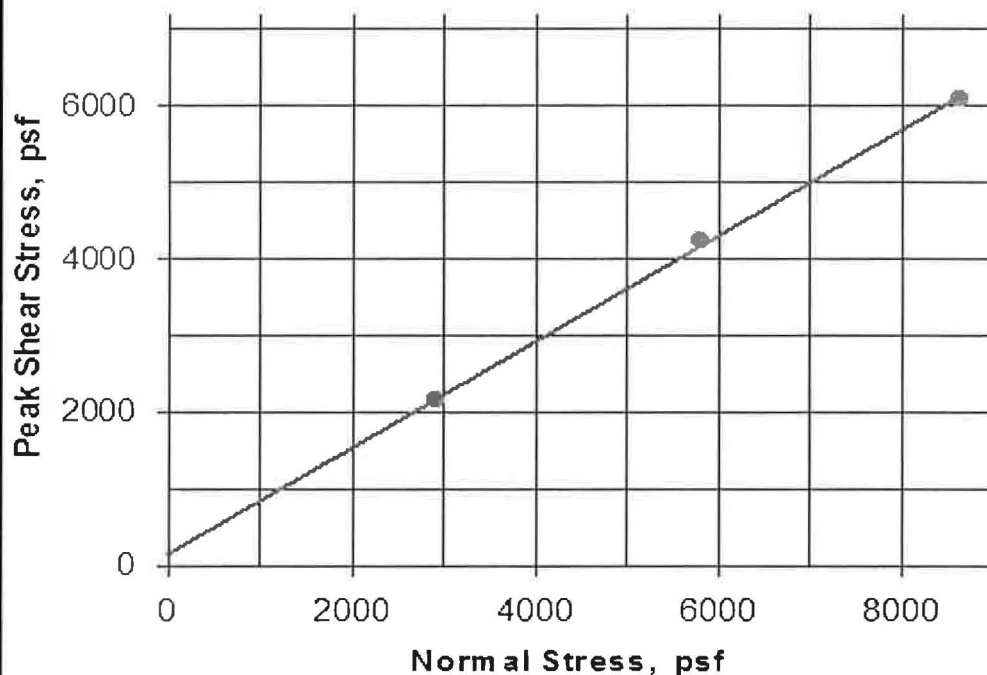
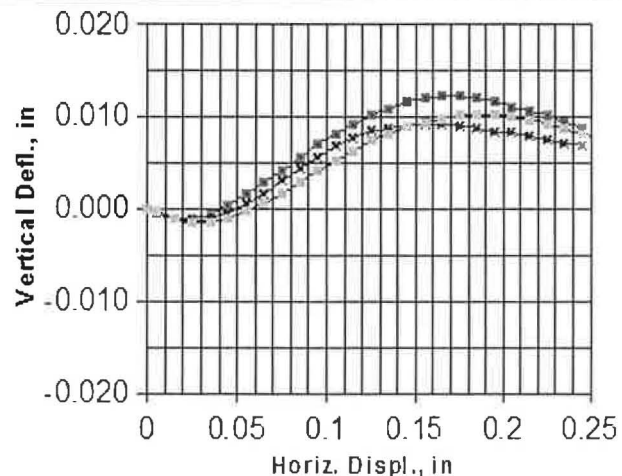
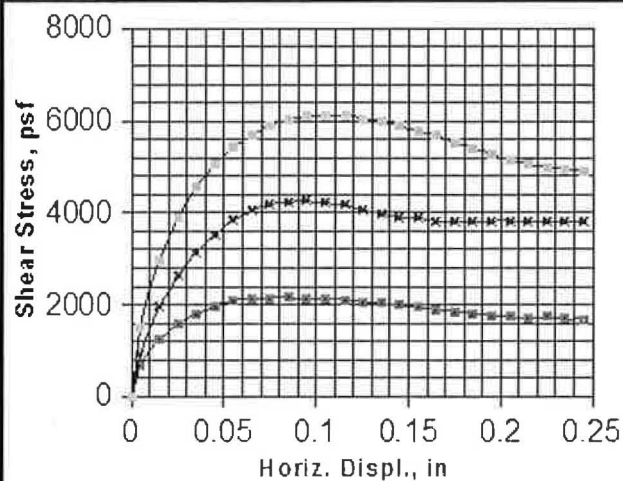
Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 112.5

dry density (pcf) = 100.0

moisture (%) = 12.5

Client: URS/ARUP/HMM JV	Boring #: S0029R	Sample #: MC05-1
Project: California High Speed Train	Depth (ft): 21.0-21.5	
Project #: 2636-001.0 G-52568	Soil: COARSE, LOOSE SAND	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Results

C = 150 psf
phi = 35 deg.

Gs = 2.70
Type = undisturbed

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	2900	2172	0.080	0.18	13.8	92.9	46	0.813	1.00	2.416	17.8	94.4	61	0.786	0.985
2	5800	4248	0.090	0.18	12.7	94.2	44	0.789	1.00	2.416	19.5	96.1	70	0.755	0.981
3	8600	6108	0.095	0.18	14.8	93.3	49	0.807	1.00	2.416	14.1	96.3	51	0.750	0.968

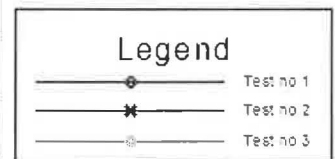
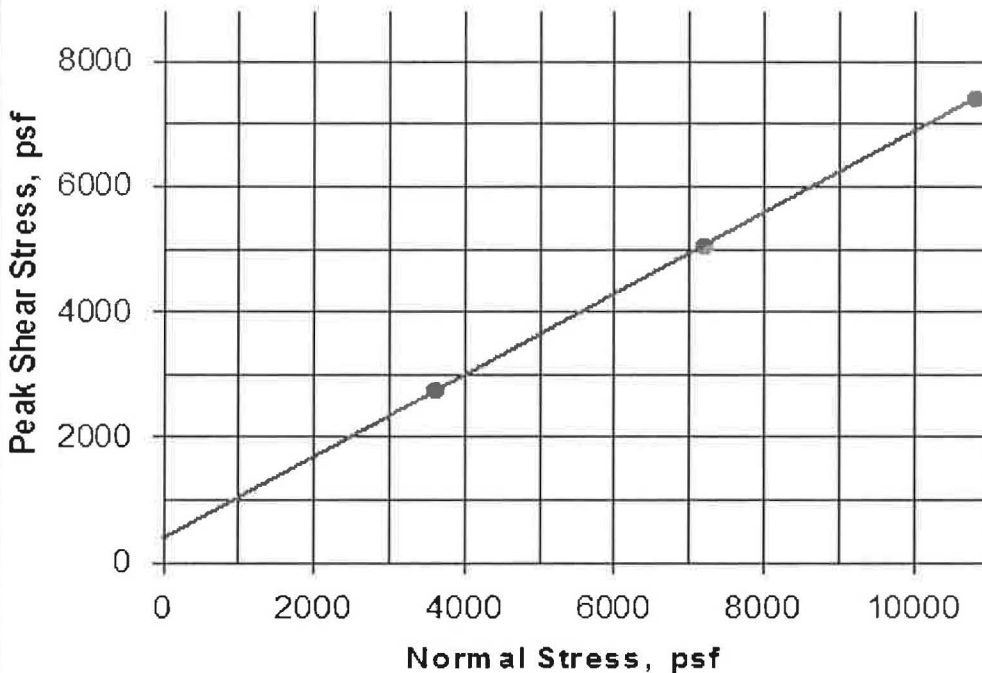
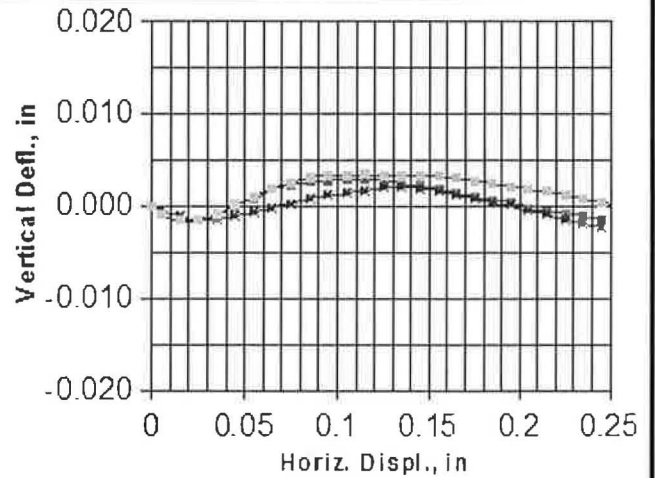
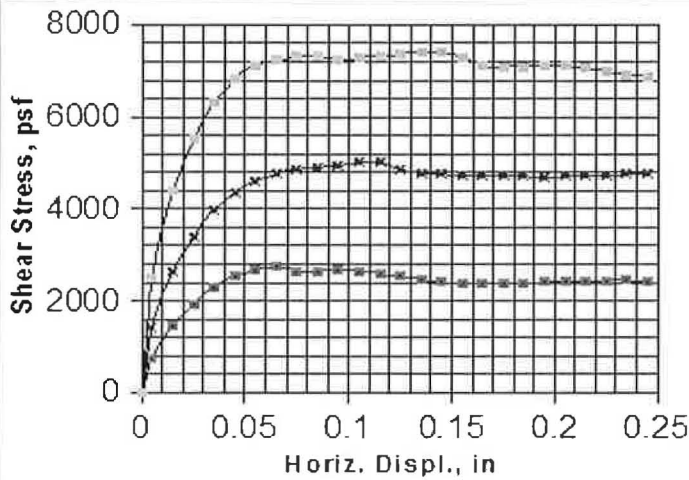
Client: URS/ARUP/HMM JV	Boring #: S0029R	Sample #: MC05-1
Project: California High Speed Train	Depth (ft): 21.0-21.5	
Project #: 2636-001.0 G-52568	Soil: COARSE, LOOSE SAND	

TEST REPORT: Direct shear - inundated, consolidated, & drained test

Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 134.9
dry density (pcf) = 115.9
moisture (%) = 16.4

Client: URS/ARUP/HMM JV	Boring #: S0029R	Sample #: MC09-1
Project: California High Speed Train	Depth (ft): 41.0-41.5	
Project #: 2636-001.0 G-52568	Soil: SANDY SILT	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Results

C = 400 psf
phi = 33 deg.

Gs = 2.70
Type = undisturbed

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	3600	2748	0.065	0.09	17.4	111.7	92	0.509	1.00	2.416	15.5	115.1	90	0.464	0.970
2	7200	5040	0.110	0.09	17.2	113.3	95	0.487	1.00	2.416	15.3	117.6	95	0.433	0.963
3	10800	7404	0.140	0.09	16.1	116.0	96	0.453	1.00	2.416	15.5	117.9	97	0.429	0.984

Client: **URS/ARUP/HMM JV**

Boring #: **S0029R**

Sample #: **MC09-1**

Project: **California High Speed Train**

Depth (ft): **41.0-41.5**

Project #: **2636-001.0 G-52568**

Soil: **SANDY SILT**

TEST REPORT: Direct shear - inundated, consolidated, & drained test

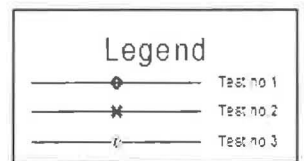
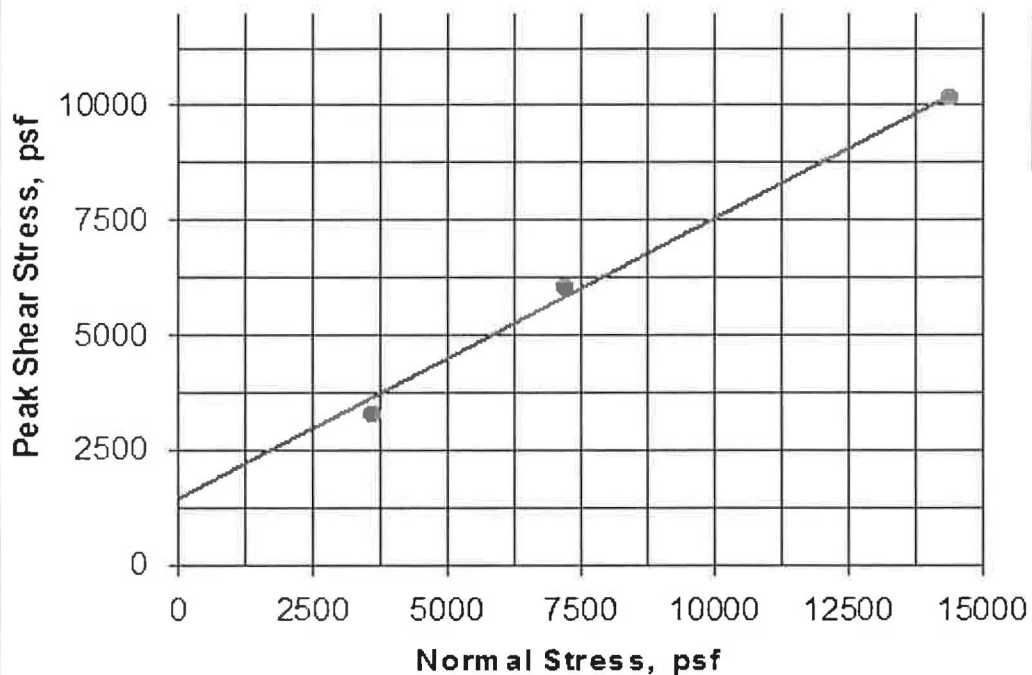
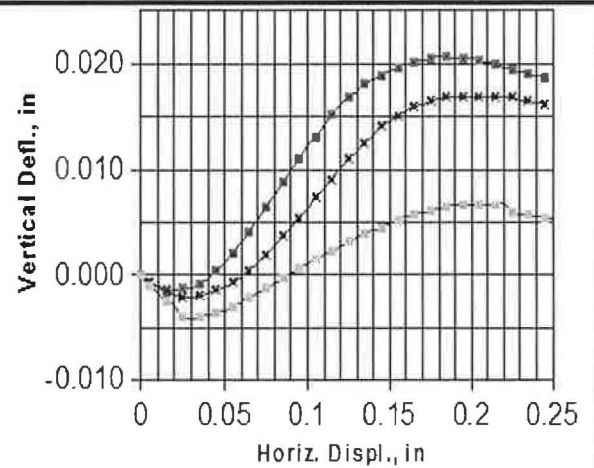
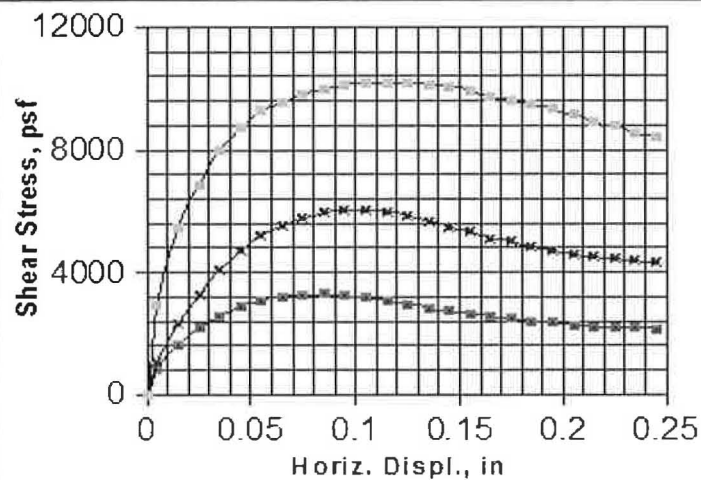
Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 106.0

dry density (pcf) = 94.7

moisture (%) = 12.0

Client: URS/ARUP/HMM JV	Boring #: S0029R	Sample #: MC14-1
Project: California High Speed Train	Depth (ft): 61.0-61.5	
Project #: 2636-001.0 G-52568	Soil: MEDIUM COARSE SAND	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Results

C = 1450 psf
phi = 31 deg.

Gs = 2.70
Type = undisturbed

Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	3600	3300	0.085	0.18	29.6	84.1	80	1.003	1.00	2.416	21.4	84.7	58	0.990	0.993
2	7200	6036	0.095	0.18	11.3	98.5	43	0.711	1.00	2.416	15.5	100.8	62	0.672	0.978
3	14400	10202	0.120	0.18	12.7	95.6	45	0.763	1.00	2.416	14.2	101.3	58	0.665	0.944

Client: **URS/ARUP/HMM JV**

Boring #: **S0029R**

Sample #: **MC14-1**

Project: **California High Speed Train**

Depth (ft): **61.0-61.5**

Project #: **2636-001.0 G-52568**

Soil: **MEDIUM COARSE SAND**

TEST REPORT: Direct shear - inundated, consolidated, & drained test

COMPACTION TEST REPORT

Curve No.
52568

Test Specification:

ASTM D 1557-91 Procedure B Modified

Hammer Wt.: 10 lb.

Hammer Drop: 18 in.

Number of Layers: five

Blows per Layer: 25

Mold Size: 0.03333 cu. ft.

Test Performed on Material

Passing 3/8 in. Sieve

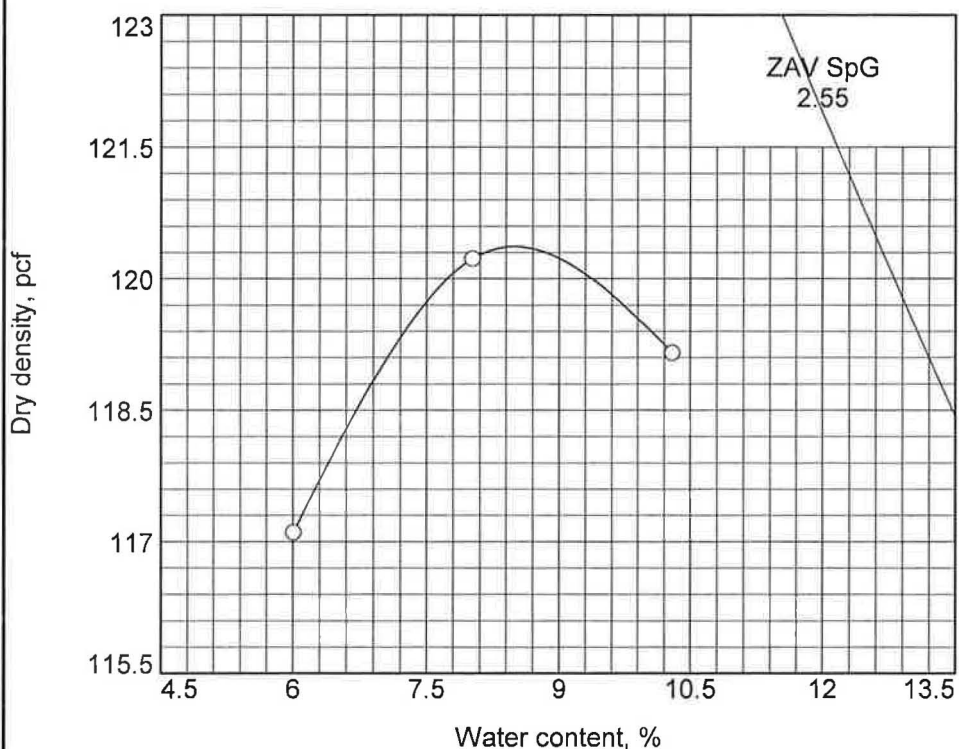
Soil Data

NM _____ Sp.G. _____

LL _____ PI _____

%>3/8 in. 0.0 %<#200 25

USCS _____ AASHTO _____



TESTING DATA

	1	2	3	4	5	6
WM + WS	6196.4	6220.0	6109.3			
WM	4223.0	4223.0	4223.0			
WW + T #1	509.3	507.9	510.3			
WD + T #1	471.5	460.5	481.4			
TARE #1	0.0	0.0	0.0			
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	8.0	10.3	6.0			
DRY DENSITY	120.2	119.2	117.1			

TEST RESULTS

Maximum dry density = 120.4 pcf

Optimum moisture = 8.5 %

Material Description

Silty sand

Project No. 2636-001.0 **Client:** URS/ARUP/HMM JV

Project: California High Speed Train

Remarks:

○ **Source:** S0029R G-52568

Depth: 0-5

Sample No.: B-01



Figure

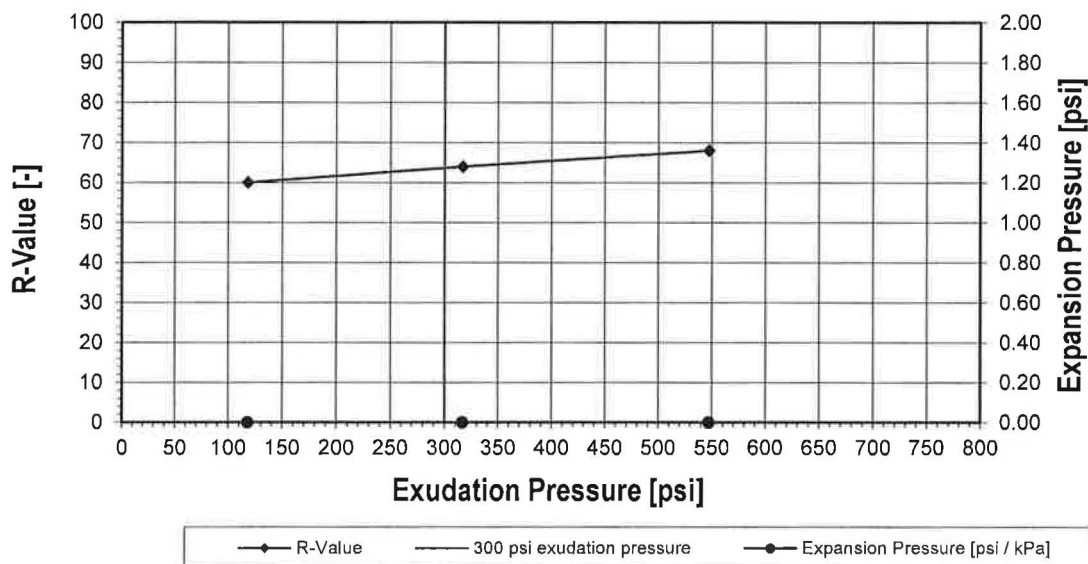
**R-Value ASTM D2844 / CT301**

Project Name: California High Speed Train
Client Name: URS/ARUP/HMM JV
Type of Material: Silty sand
Sampling Location: S0029R
Sample No.: B-01. 0.0 to 5.0
Test (ASTM D2844 / CT301):

ISI Project No.: 2636-001.0
ISI Lab No.: G-52568

Test Date: 9/16/13
Run By: LL
Checked By: LL/PH

Specimen #	1		2		3	
Compaction Pressure [psi / kPa]	250	----	275	----	295	----
Total Moisture [%]	10.5		9.8		9.2	
Density[pcf]	118.0		121.5		123.8	
Expansion Pressure [psi / kPa]	0.00	0.00	0.00	0.00	0.00	0.00
Horizontal Pressure at 160 psi [psi / kPa]	38	262	36	248	32	221
Number of Turns D [-]	4.60		4.41		4.20	
Sample Height [in. / mm]	2.35	59.7	2.43	61.7	2.43	61.7
Exudation Pressure [psi / kPa]	118	814	317	2186	547	3772
R-Value [-]	63.6		66.1		70.4	
Corrected R-Value [-]	60.0		64.0		68.0	



Corrected R-Value at 300 psi / 2.07 MPa Exudation Pressure =

63.0



Client: URS/ARUP/HMM JV
 Clients Project No.: S0029R
 Clients Project Name: California High Speed Train

Project No.: 2636-001.0
 ISI Lab No.: G-52568
 Date Received: 9/5/2013
 Date Tested: 9/16/2013

CALIFORNIA BEARING RATIO
 (ASTM D-1883)

Lab No.	G-52568		
Sample:	S-0029R / B-01		
Compaction Procedure:	D1557		
Maximum Dry Density pcf:	120.4		
Optimum Moisture Content %:	8.5		
Condition of CBR Soil Sample:	Soaked 96 hours		
% + 3/4" Size Replacement:	0		
	1	2	3
Dry Density Before Soaking pcf:	121	115.4	111.9
Percent Relative Compaction %:	100.5	95.8	92.9
Dry Density After Soaking pcf:	124.1	117.9	113
Moisture Content Before Compaction %:	8.7	8.6	8.7
Moisture Content After Compaction %:	8.7	8.6	8.7
Moisture Content Top 1" After Soaking %:	12.6	13	13.6
Average Moisture Content After Soaking %	10.8	12.2	13.5
Percent Swell %:	0.1	0	0
Bearing Ratio @ 0.100"	14	12	10
Bearing Ratio @ 0.200"	26	23	13
Surcharge Weight lbs.:	10	10	10

Specimens were compacted at optimum moisture content (determined in accordance with ASTM D1557) with varying amounts of compactive effort and then soaked for 96 hours with a 10 pound surcharge prior to penetration.

Specimen No.	Percent Relative Compaction	Bearing Ratio @ 0.1" Pen.	Bearing Ratio @ 0.2" Pen.	Bearing Ratio @ 0.3" Pen.	Bearing Ratio @ 0.4" Pen.	Bearing Ratio @ 0.5" Pen.	Percent Swell
	90	4	5	0	0	0	0
	95	12	21	0	0	0	0
	100	14	26	0	0	0	0.1

Per ASTM D-1883, when the bearing ratio at 0.2 inches is greater than the bearing ratio at 0.1 inches, use the bearing ratio at 0.2 inches.